PATENTS
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IN THE CLAIMS:

1. (Currently amended) A system comprising:

at least one first conductive element ~~in contact with at least one dielectric mismatch boundary;~~ and at least one second conductive element ~~in contact with the at least one dielectric mismatch boundary;~~ so disposed with respect to each other that, when the first and second conductive elements extend through a dielectric mismatch boundary, a first electromagnetic signal will induce a second electromagnetic signal to propagate along the second conductive element;

a transmitter operable to drive the first electromagnetic signal along the at least one first conductive element without also driving the at least one second conductive element; and

a receiver for receiving the second ~~an~~ electromagnetic signal from the at least one second conductive element, ~~the received electromagnetic signal being based on an electromagnetic signal transmitted on the at least one first conductive element~~ the received electromagnetic signal ~~and~~ being coupled to the at least one second conductive element in response to the at least one dielectric mismatch boundary.

2. (Previously presented) The system of claim 1 further comprising a third conductive element surrounding at least part of the at least one first and second conductive elements and being connected to a ground plane.

3. (Previously presented) The system of claim 1 wherein the at least one first and second conductive elements are positioned substantially parallel to each other and substantially perpendicular to the at least one dielectric mismatch boundary.

4. (Previously presented) The system of claim 1 wherein the at least one dielectric mismatch boundary corresponds to a region associated with at least one first substance having a first dielectric constant and at least one second substance having a second dielectric constant.

5. (Previously presented) The system of claim 1 wherein the electromagnetic signal exhibits an ultra-wideband frequency.

6. (Previously presented) The system of claim 1 wherein the at least one dielectric mismatch boundary corresponds to a transitional region between a gaseous substance and a liquid substance.

7. (Previously presented) The system of claim 1 wherein the at least one dielectric mismatch boundary corresponds to a transitional region between at least two of a vacuum, a gaseous substance, a liquid substance, a semi-solid substance, and a solid substance.

8. (Cancelled) The system of claim 1 further comprising a transmitter for forming the electromagnetic signal.

9. (Currently amended) The system of claim 1 further comprising a processing element executing instructions to evaluate the received electromagnetic signal relative to the driven ~~transmitted~~ electromagnetic signal to determine a characteristic of at least one substance associated with the dielectric mismatch boundary.

10. (Previously presented) The system of claim 9 wherein the processing element communicates at least one of the attributes of the received electromagnetic signal and the characteristic of the at least one substance to a digital data processing device during a communication session.

11. (Currently amended) The system of claim 9 wherein the attributes of the received electromagnetic signal relative to the driven ~~transmitted~~ electromagnetic signal includes a time delay and the characteristic of the at least one substance corresponds to a level of that substance.

12. (Currently amended) The system of claim 11 wherein the time delay attribute of the received electromagnetic signal relative to the driven ~~transmitted~~ electromagnetic signal is based, at least in part, on a time differential between signals associated with an equivalent time sampling circuit of the receiver.

13. (Previously presented) The system of claim 11 wherein the level corresponds to a volume of fluid in at least one of an above-ground storage tank and a below-ground storage tank.

14. (Previously presented) The system of claim 1 wherein the at least one first and second conductive elements form a parallel conductor transmission line structure.

15. (Previously presented) The system of claim 1 wherein the at least one first and second conductive elements are flexible.

16. (Previously presented) The system of claim 1 wherein the at least one first and second conductive elements exhibit quadrilateral cross-sections.

17. (Previously presented) The system of claim 1 wherein the at least one first and second conductive elements exhibit substantially identical cross-sections.

18. (Previously presented) The system of claim 1 further comprising:

a coupler positioned at the dielectric mismatch boundary for coupling the received electromagnetic signal, the size of the received electromagnetic signal being independent of dielectric properties associated with substances forming the dielectric mismatch boundary.

19. (Previously presented) The system of claim 18 wherein the coupler operates as an electromagnetic shunt path between the at least one first and second conductive elements.

20. (Previously presented) The system of claim 18 wherein the coupler exhibits a length corresponding to at least one-quarter of a propagation velocity pulse length of the transmitted electromagnetic signal.

21. (Previously presented) The system of claim 18 further comprising:

a float for positioning the coupler relative to the at least one dielectric mismatch boundary.

22. (Previously presented) The system of claim 21 wherein the float includes a buoyant component and a weighted component.

23. (Currently amended) A method comprising:

driving ~~transmitting an~~ a first electromagnetic signal on an at least one first conductive element without also driving an at least one second conductive element, the first conductive element and second conductive element so disposed with respect to each other that, when the first and second conductive elements extend through at least one dielectric mismatch boundary, a first electromagnetic signal will induce a second electromagnetic signal to propagate along the second conductive element ~~being in contact with an at least one dielectric mismatch boundary~~; and

receiving, from the at least one second conductive element, a second ~~an~~ electromagnetic signal induced by ~~based on~~ the ~~transmitted~~ first electromagnetic signal driven along the ~~at an~~ at least one first ~~second~~ conductive element, the second ~~received~~ electromagnetic signal being coupled to the at least one second conductive element in response to the at least one dielectric mismatch boundary~~, wherein the at least one second conductive element is in contact with the at least one dielectric mismatch boundary~~.

24. (Previously presented) The method of claim 23 further comprising:

surrounding at least part of the at least one first and second conductive elements with a third conductive element connected to a ground plane.

25. (Currently amended) The method of claim 23 further comprising:

evaluating attributes of the second ~~received~~ electromagnetic signal relative to the first ~~transmitted~~ electromagnetic signal to determine a characteristic of at least one substance associated with the dielectric mismatch boundary

26. (Currently amended) The method of claim 25 wherein the attributes of the second ~~received~~ electromagnetic signal relative to the first ~~transmitted~~ electromagnetic signal includes a time delay and the characteristic of the at least one substance corresponds to a level of that substance.

27. (Previously presented) The method of claim 23 wherein the at least one first and second conductive elements are flexible.

28. (Currently amended) The method of claim 23 further comprising:

providing a coupler positioned at the dielectric mismatch boundary for coupling the second ~~received~~ electromagnetic signal to the at least one second conductive element, the

size of the second ~~received~~ electromagnetic signal being independent of dielectric properties associated with substances forming the at least one dielectric mismatch boundary.

29. (Previously presented) The method of claim 28 further comprising:

providing a float for positioning the coupler relative to the at least one dielectric mismatch boundary.